



# RESEARCH, DEVELOPMENT and TECHNOLOGY TRANSFER QUARTERLY PROGRESS REPORT (QPR)

Wisconsin Department of Transportation (WisDOT)  
DT1241 5/2014

## INSTRUCTIONS:

Research principal investigators and/or project managers should complete a quarterly progress report (QPR) for each calendar quarter during which the projects are active.

|  |   |   |  |
|--|---|---|--|
| <b>WisDOT Research Program Category</b><br><input type="checkbox"/> Policy Research<br><input checked="" type="checkbox"/> Wisconsin Highway Research Program<br><input type="checkbox"/> Other: _____ |   | <b>Report Period</b> (enter year and check which quarter)<br>Year: <u>2014</u><br><input type="checkbox"/> Quarter 1 (Jan 1 – Mar 31) <input checked="" type="checkbox"/> Quarter 3 (Jul 1 – Sep 30)<br><input type="checkbox"/> Quarter 2 (Apr 1 – Jun 30) <input type="checkbox"/> Quarter 4 (Oct 1 – Dec 31) |  |
| <b>Project Title</b><br><u>Understanding and Complying with Storm Water Mitigation Guidelines from the EPA</u>   |   | <b>WisDOT Project ID</b><br><u>0092-13-03</u>   |  |
| <b>Principal Investigator Name</b><br><u>Qian Liao</u>   | <b>Project Oversight Committee Chair Name</b><br><u>Jeff Horsfall</u> | <b>Project Start Date (m/d/yyyy)</b><br><u>8/14/2012</u>  |  |
| <b>(Area Code) Telephone Number</b><br><u>414-229-4228</u>   | <b>(Area Code) Telephone Number</b><br><u>608-243-5993</u>            | <b>Original End Date (m/d/yyyy)</b><br><u>2/13/2014</u>   |  |
| <b>Email Address</b><br><u>liao@uwm.edu</u>  | <b>Email Address</b><br><u>Jeffrey.Horsfall@dot.wi.gov</u>            | <b>Current End Date (m/d/yyyy)</b><br><u>12/13/2014</u>   |  |

## Project Schedule Status (check one)

☐ On Schedule ☒ On Revised Schedule ☐ Ahead of Schedule ☐ Behind Schedule

## Project Budget Status

| Total Project Budget | Expenditures Current Quarter | Total Expenditures | % Funds Expended | % Work Completed |
|----------------------|------------------------------|--------------------|------------------|------------------|
| \$74,998.00          | \$3,000.00                   | \$51,104.00        | 68%              | 75%              |

## Project Description

The overall objective of the proposed research is to design and conduct field sampling experiments to monitor the concentration of sediment, turbidity and other associated pollutant in stormwater runoff at selected WisDOT constructions sites representing different stormwater runoff characteristics, e.g., urban vs. rural. The research will also evaluate the effectiveness of various best management practices that control erosion and sediment discharge based on quantitative measures, i.e., the turbidity level. Data collected and analyzed will be applied to establish appropriate stormwater runoff monitoring protocols for WisDOT construction projects that can comply with the recently established Effluent Limitation Guidelines (ELGs) by EPA. We will also communicate the research results with WisDOT for future implementation. Specifically, the proposed study will address the following objectives.

- We will review the technical details of the EPA ELGs, design sample collection and measurement procedures.
- We will identify on-going WisDOT construction sites for monitoring implementations, Site selected shall be representative of various soil type, disturbed area, hydrological conditions, and erosion control BMPs.
- For each selected site, we will determine sampling frequencies based on the magnitude (return period) and duration of precipitation events. We will select sampling locations where water enters the construction site, at pre-treatment, at post-treatment and leaving the construction site (discharging points).
- Based on sampling results, we will determine the range of the effectiveness of different erosion control devices (BMP's) in minimizing the TSS and turbidity level.
- We will also monitor the change of turbidity level of the nearby receiving water bodies, including streams and rivers or stormwater drainage systems, on both the upstream and downstream side of the construction site.

## Progress This Quarter (includes meetings, work plan status, contract status, significant progress, etc.)

- Conducted comprehensive sampling work at the I-94 zoo interchange construction site in West Allis, WI, including 7 onsite sampling during storm events and 3 month of continuous remote monitoring of turbidity at the drainage point of the site.
- Conducted statistical analysis on the comprehensive dataset from the zoo interchange site to investigate the relation between runoff water turbidity and the precipitation characteristics, including duration, mean intensity, peak intensity and total precipitation depth. While good correlation ( $R^2 = 54\%$ ) between the peak runoff turbidity and the total precipitation depth was found, there appeared to be no statistical correlation with other storm parameters.

- Laboratory analysis on the correlation between total suspended solids (TSS) and turbidity NTU indicated linear correlation ( $R^2 = 76\%$ ), suggesting NTU as a possible surrogate for TSS if well calibrated. The correlation is not universal but specific for a particular site.
- Met with the DOT POC committee to present the findings and requested for an additional no-cost extension to apply automatic sampling systems to another 6 construction sites across the state. Discussion with the POC also includes removing the requirement on the disturbed area (i.e., > 10 acre) from site selection to identify more site candidates.

#### Anticipated Work Next Quarter

- Identify 6 more sampling sites for comprehensive monitoring
- Draft interim report.

#### Circumstances Affecting Project or Budget

N/A

#### Attach / Insert Gantt Chart and Other Project Documentation

| Task  | 2012 | 2013 |   |   |   | 2014 |   |   |   |
|---|------|------|---|---|---|------|---|---|---|
|   | 4    | 1    | 2 | 3 | 4 | 1    | 2 | 3 | 4 |
| 1. Literature Review                                |      |      |   |   |   |      |   |   |   |
|   |      |      |   |   |   |      |   |   |   |
| 2. Work plan development                            |      |      |   |   |   |      |   |   |   |
|   |      |      |   |   |   |      |   |   |   |
| 3. Work plan execution and data collection/analysis |      |      |   |   |   |      |   |   |   |
|   |      |      |   |   |   |      |   |   |   |
| 4. Final Report                                     |      |      |   |   |   |      |   |   |   |
|   |      |      |   |   |   |      |   |   |   |

Proposed

Current

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| For WisDOT Use Only                  |  |
|--------------------------------------|--|
| Staff Receiving QPR<br>J. Walejko    | Date Received (m/d/yyyy)<br>11/19/2014 |
| Staff Approving QPR<br>Jeff Horsfall | Date Approved (m/d/yyyy)<br>11/24/2014 |